

REMARKS

Applicant appreciates the review by the Examiner, as well as the Examiner's indication that claims 4, 10-15 and 19 all contain patentable subject matter that would be allowable if rewritten to overcome the rejection(s) under the provisions of 35 U.S.C. §112, second paragraph, and if claims 4, 11-15, and 19 were rewritten to include all of the limitations of the base claim and any intervening claims. Applicant believes that all necessary amendments have been made in order to overcome the rejections under 35 U.S.C. §112, second paragraph. Claims 11-15 all depend directly from allowable independent claim 10, therefore Applicant respectfully submits that claims 10-15 are all in condition for allowance.

AMENDMENTS TO THE DRAWINGS

The Examiner objected to the figures because they did not include reference signs for parts 42 and 55, which were mentioned in the Detailed Description of the Preferred Embodiment section of the Application. The Examiner also objected to the Figures because "35" was designating separate parts in Figure 2. Applicant submits the enclosed "Replacement Sheet" that Applicant believes to remedy both objections. First, protruding surface 42 that is fixedly connected to housing 29 was incorrectly numbered as "40" in Figure 2 instead of "42." See paragraph [0022] of the Application. This error has been corrected. Second, the "35" designating the upper section of the pump was supposed to be the exit volute 55 that is located above the uppermost pump stage 43. See paragraph [0023] of the Application. Applicant has amended Figure 2 such that "55" is designating the exit volute at the upper section of the pump. An annotated version of Figure 2 is also enclosed to show such changes.

AMENDMENTS TO THE SPECIFICATION

The Examiner requested several changes to the specification, and Applicant has made some changes that were not specifically requested. For example, Applicant amended paragraphs [0007] and [0033] to remedy clerical and typographical errors pursuant to the suggested changes from the Examiner. Applicant also amended paragraphs [0012] – [0016] pertaining to the description of the Figures because paragraphs [0012] and [0013] for Figures 4 and 5 were reversed. Paragraphs [0014] – [0016] were amended to correct the cross-references included therein. Support for the changes can be found in paragraph [0026] and Figure 3 that Figure 4 is supposed to be an illustration of the cross-section of the impeller vane 71, and paragraphs [0029] that Figures 5 and 6 illustrate the diffuser 63.

The Examiner also objected to the specification as failing to provide proper antecedent basis for the claimed subject matter. Specifically the Examiner objected to claims 2, 4, 6, 7, 10, 11, 14, 17, and 19 for including limitations that were not specifically included in the Detailed Description of the Preferred Embodiment. For example, the Examiner pointed out that claims 2 and 4 the leading and trailing edges of the impeller vanes are parallel to each other and to a radial line of the impeller, respectively, but the specification said that they were substantially parallel. Applicant appreciates the Examiner's thoroughness and has amended claims 2 and 4 to make them broader in scope from "parallel" to "substantially parallel," however, Applicant respectfully submits that amendment to the specification is not required for the other claims.

The sections of the rules and the MPEP relied upon are more relevant when facing amendments to claims or new claims. One must always remember that the claims original are considered to be part of the specification. *See* MPEP §2163. For this reason, there is a strong presumption that an adequate written description of the claimed invention is present when the original application is filed. *See* MPEP §2163 (I)(A); *see* MPEP §2163.03. The claimed subject

matter need not be described literally (i.e., using the same terms or *in heac verba*) in order for the disclosure to satisfy the description requirement. See MPEP §2163.02. In fact, as noted in the MPEP, the figures of an application are sufficient to satisfy the "written description" requirements of the application under the provisions of 35 U.S.C. §112. See MPEP §2163(II)(A)(3). As support for that the figures can satisfy the written disclosure requirement, the MPEP cited the following passages from court decisions: *Vas-Cath, Inc. v. Mahurkar*, 935 F.2d 1555, 1565 (Fed. Cir. 1991) ("drawings alone may provide a 'written description' of an invention as required by Sec. 112"); *In re Wolfensperger*, 302 F.2d 950 (CCPA 1962) (the drawings of applicant's specification provided sufficient written descriptive support for the claim at issue); *Autogiro Co. of America v. United States*, 384 F.2d 391, 398 (Ct. Cl. 1967) ("In those instances where a visual representation can flesh out words, drawings may be used in the same manner and with the same limitations as the specification"). Applicant respectfully submits that the Examiner has not overcome the strong presumption that the specification (including the detailed description, the figures, and the claims) fails to provide support for Applicant's original claims.

For example, the Examiner objected that there was allegedly nothing in the detailed description states that each diffuser blade is curved in more than one plane, as included in claims 6 and 14. However, Applicant submits that when the relevant person of skill in the art reads claims 6 and 14, and views Figure 6 of the Application, one skilled in the art could easily see that each diffuser blade 93 is curved along an axial plane as one looks from the leading or upstream edge of blade 93 to the trailing or downstream edge of blade 93. Moreover, one having skill in the art would also see that each diffuser blade 93 illustrated in Figure 6 is curved along a radial plane as one looks from the radially inward edge of blade 93 connecting to hub 85 to the radially

outward edge of blade 93 connecting to outer ring 91. Further support is also found in paragraphs [0029] – [0032], especially since Applicant stated:

Blades 93 are preferably portions or segments of a sphere. Accordingly, blades 93 have a scoop-shaped profile that further mixes the liquid and gas particles in well fluid 15 while redirecting well fluid 15 to the next stage 65 or to upper section 35.

Applicant respectfully submits that there is nothing that is included in the original claims that one skilled in the art would not appreciate after reviewing the Applicant's Figures, and complete specification inclusive of the claims.

Moreover, Applicant respectfully submits that there is no requirement in the MPEP that the Applicant copy and paste Applicant's claims into the Detailed Description of the Preferred Embodiment, as the Examiner is apparently requesting of Applicant. While such an amendment is allowed under MPEP 2163.06 because anything disclosed in the claims, specification, and/or drawings can be added to any other part of the application without introducing new matter, such an amendment should not be required by the Examiner. Support is already found in the claims and the figures, and such an amendment needlessly increases the length of the Application. Accordingly, Applicant declines to incorporate such an amendment, and respectfully requests the Examiner remove such objections to the specification.

The Examiner also requested that Applicant amend the specification to remove "PATENT APPLICATION," the inventors' names, and the attorney docket number from the first six lines of the Application, as being "superfluous." Applicant respectfully declines to do so. First of all, there is nothing in the rules or the MPEP that requires Applicant not include such information on the first page of the Application. Moreover, including such information helps to reduce the risk of mishandling at the USPTO when the Application is physically separated (i.e., the staple or binder clip is removed from the packet) from the documents already providing such

information. Applicant respectfully submits that there is a benefit to including such information, and neither Applicant nor its attorneys have ever been asked to remove such information from any of their other applications. Accordingly, Applicant respectfully submits that such an amendment is not required and declines to make the amendment suggested by the Examiner.

REJECTIONS UNDER 35 U.S.C. §112, SECOND PARAGRAPH

The Examiner rejected claims 1-8, 10-15, and 17-22 under the provisions of 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention. In claims 1, 10, 17, and 21, the Examiner rejected the use of "therewith" as being indefinite because it was allegedly unclear which element this referred to. Though Applicant respectfully disagrees that such use was indefinite as the impeller is rotated with the shaft, and one skilled in the art would understand such, Applicant has amended these claims to further prosecution in a timely manner.

In claims 6 and 14, the Examiner alleged that the descriptor "is curved in more than one plane" is unclear with respect to each diffuser blade. Applicant respectfully disagrees, and respectfully submits that one skilled in the art would be able to understand such. As discussed before, when the relevant person of skill in the art reads claims 6 and 14, and views Figure 6 of the Application, one skilled in the art could easily see that each diffuser blade 93 is curved along an axial plane as one looks from the leading or upstream edge of blade 93 to the trailing or downstream edge of blade 93. Moreover, one having skill in the art would also see that each diffuser blade 93 illustrated in Figure 6 is curved along a radial plane as one looks from the radially inward edge of blade 93 connecting to hub 85 to the radially outward edge of blade 93 connecting to outer ring 91. Such a diffuser blade that is curved axially and radially is at least one example of a blade that is curved in more than one plane. Furthermore, Applicant also described the blades as being portions of segments of a sphere, which inherently is curved along

more than one plane. Figure 6 and the passage of paragraph [0032] of the Application are both examples of blades being curve along more than one plane. Accordingly, Applicant respectfully submits that one skilled in the art would easily understand the "is curved in more than one plane" claim term with respect to the diffusers. Therefore, Applicant respectfully submits that the rejection under 35 U.S.C. § 112, second paragraph for claims 6 and 14 should be removed.

In claims 8, 15, and 21, the Examiner alleged that the term "the conditioning impellers" is ambiguous because the antecedent basis only recited "a conditioning impeller." Applicant appreciates the Examiner's observation, and has amended the claims such that claims 8, 15, and 21 refer to the conditioning "impeller." Thus, Applicant respectfully submits that the rejection under 35 U.S.C. § 112, second paragraph for claims 8, 15, and 21 should be removed.

Also in claim 8, the Examiner rejected the term "the well fluid" for not having an antecedent basis in claim 1, from which claim 8 depends. Applicant amended the "fluid" in claim to "well fluid." Therefore, Applicant respectfully submits that the rejection under 35 U.S.C. § 112, second paragraph for claim 8 should be removed.

In claim 13, the Examiner rejected the terms "an upstream side" and "a downstream side" of the diffuser as being double recitations of that in base claim 10. Applicant respectfully submits that such rejection is now moot in light of the amendments to claim 13 and requests the Examiner remove such rejection.

OBVIOUSNESS REJECTIONS UNDER 35 U.S.C. §103

The Examiner also rejected claims 1, 3, 5-8, 17-18, and 20-22 as being obvious over U.S. Patent No. 3,267,869, issued to Vartapetov (hereinafter "Vartapetov" or "the Vartapetov patent"), in view of U.S. Patent No. 3,438,329, issued to Fuller (hereinafter "Fuller" or "the Fuller patent"). The Examiner also rejected claims 1, 3, 5-8, 17-18, and 20-22 as being obvious over

Vartapetov in view of Fuller, and further in view of Japanese Patent 62-96,799 (hereinafter "the Japanese patent").

The Vartapetov Patent

The Vartapetov reference discloses a multistage axial flow high pressure pump that pumps liquids at high pressure and low volume. *See* the Vartapetov patent (Col. 1: ll. 15-20). The problem being addressed by Vartapetov was that in order to increase the output pressure of the liquid from prior art pumps, the flow rate or capacity also needed to be increased. *See* the Vartapetov patent (Col. 1: ll. 25-38). The objective of Vartapetov's pump was to invent a pump that could deliver liquids at a high pressure without having to needlessly increase the flow rate or capacity. *See* the Vartapetov patent (Col. 1: ll. 39-41). To achieve this objective, Vartapetov placed a series of stackable pump stages assembled on a common shaft 20 extending within a pump housing 10. *See* the Vartapetov patent (Col. 1: ll. 42-48, Figures 1 and 2). Each of the stages comprised an impellor 23 and a guide vane structure 30, and each of the stages are identical to each other. *See* the Vartapetov patent (Col. 2: ll. 54-62, Figures 2 and 3). Therefore, as stated by Vartapetov, there is no difference between the impellers 23 and guide vanes assemblies 30 associated with each stage and illustrated in Figure 3. *See* the Vartapetov patent (Col. 2: ll. 54-62, Figures 2 and 3).

Each impellor 23 includes a central body ring 27 with a plurality of blades 29 spaced intermittently around the periphery of the body ring 27. *See* the Vartapetov patent (Col. 3: ll. 8-11, Figures 4 and 5). The blades 29 extend radially from the body ring 27, are generally shaped like an air foil, and are angled relative to the axis of the shaft 20. *See* the Vartapetov patent (Col. 3: ll. 10-18, Figures 3). Each guide vane assembly 30 remains stationary relative to the shaft 20 and the impeller 23. Each guide vane assembly includes an inner ring 35 and a plurality of circumferentially spaced, air foil shaped guide vanes 34 disposed substantially circumferentially

around the inner ring and extending axially with the pump housing 10. *See* the Vartapetov patent (Col. 3: ll. 20-35, Figure 6).

When liquid enters the impeller 23 rotating in direction 46 from the axial direction 47, the impeller 23 imparts axial and rotary flow on the liquid such that the liquid flows axially toward the trailing edge of the impeller and the guide vane assembly 30, as well as flowing in a circular or rotary fashion around the shaft 20. *See* the Vartapetov patent (Col. 3: ln. 69 – Col. 4: ln. 3, Figure 4). The axially extending guide vanes 34 help to counteract the rotary flow of the liquid to direct the liquid in a substantially axial direction to the impeller 23 of the next stage. There is nothing describing the guide vanes 34 directing the liquid radially inward against any centrifugal forces. Nor is there any mention of the leading edges of the blades 29 and vanes 34 extending in any direction other than radially outward such that the outer end of the leading edges of the blades 29 or vanes 34 are rotationally forward of the inner end of the leading edges of the blades or vanes. *See* the Vartapetov patent (Figures 5 and 6). Moreover, there is no disclosure such that the median line of the radially extending blades 29 is offset from the axis of the body ring 27.

Vartapetov Fails to Disclose the Elements of Applicant's Claims

In order to establish a prima facie case of obviousness, the Examiner must show that either Vartapetov or the other cited references teach or suggest all the claim limitations of the rejected claims. *See* MPEP 706.02(j). The Vartapetov patent does not disclose several of the elements included in the rejected independent claims, including but not limited to the "a plurality of impeller vanes extending from the outer circumference of the hub of the conditioning impeller...wherein a radial line passing through an outer end of the leading edge of each of the vanes is rotationally forward of an inner end of the leading edge of each of the vanes" element of claims 1 and 17. In the Vartapetov impeller 23, a radial line extends through both the outer and

inner ends of the leading edge of each blade 29. Therefore, there is not a radial line passing through the outer end of the Vartapetov blade 29 that is rotationally forward of the inner end of the Vartapetov blade 29. Accordingly, Applicant respectfully submits that the Vartapetov patent fails to disclose the "plurality of impeller vanes" element included in independent claims 1 and 17. Because neither Vartapetov alone, or in any combination with Fuller and the Japanese patent, teaches the Applicant's "plurality of impeller vanes" element found in independent claims 1 and 17, Applicant respectfully submits that none of claims 1-3, 5-8, 17-18, and 20 are obvious over the cited art when viewed by one skilled in the art. Therefore, Applicant respectfully requests reconsideration of the rejection, and that the Examiner remove these rejections as claims 1-3, 5-8, 17-18, and 20 are each patentable over the cited art.

With respect to claims 21-22, Vartapetov fails to disclose at least the "continuing to force the well fluid radially inward with a stationary conditioning diffuser receiving well fluid from the impeller..." method step of claim 21. As noted above, when liquid enters the Vartapetov impellor 23 rotating in direction 46 from the axial direction 47, the impeller imparts axial and rotary flow on the liquid such that the liquid flows axially toward the trailing edge of the impeller and the guide vane assembly 30. *See* the Vartapetov patent (Col. 3: ln. 69 – Col. 4: ln. 3, Figure 4). The rotation of the impeller 23 also causes the liquid to flow in a circular or rotary fashion around the shaft 20. *See* the Vartapetov patent (Col. 3: ln. 69 – Col. 4: ln. 3, Figure 4). The axially extending guide vanes 34 help to counteract the rotary flow of the liquid to direct the liquid in a substantially axial direction to the impeller 23 of the next stage. There is nothing describing the guide vanes 34 directing the liquid radially inward against any centrifugal forces.

Moreover, one skilled in the art would believe that the Vartapetov guide vanes 34 do nothing to counter centrifugal forces and direct the liquid radially inward because the outer ends

of the leading and trailing edges of the vanes 34 are radially in-line with the inner ends of the leading and trailing edges of the vanes 34. While the Vartapetov vanes 34 help to convert rotary and axial flow of the liquid to substantially axial flow, one skilled in the art would not see any disclosure or suggestion of counting radially outward, centrifugal flow with diffuser vanes that force the liquid radially inward. Therefore, Applicant respectfully submits that the Vartapetov patent fails to disclose the "continuing to force the well fluid radially inward with a stationary conditioning diffuser receiving well fluid from the impeller..." elemental step included in independent claim 21 and dependent claim 22. Because neither Vartapetov alone, or in any combination with Fuller and the Japanese patent, teaches the Applicant's "continuing to force the well fluid radially inward with a stationary conditioning diffuser receiving well fluid from the impeller..." method step in claims 21-22, Applicant respectfully submits that none of claims 21-22 are obvious over the cited art when viewed by one skilled in the art. Therefore, Applicant respectfully requests reconsideration of the rejection, and that the Examiner remove these rejections as claims 21-22 are each patentable over the cited art.

In addition to the reasons listed above, claims 21-22 are also patentable because Vartapetov, either alone or in combination with the other references, fails to teach the "creating turbulence by forcing the well fluid radially inward against centrifugal forces with a plurality of impeller vanes extending from the outer circumference of the hub of the conditioning impeller that have an outer end of a leading edge of each of each the vanes that is rotationally forward of an inner end of the leading edge of each of the vanes" method step included in independent claim 21. None of the cited references teach, suggest, or intimate using the impeller vanes to force the fluid flowing through the impeller radially inward against the natural centrifugal forces associated with the rotating impeller. Moreover, none of the references suggest doing such an

act in order to "create turbulence," or turbulent flow through the pump. Even the Examiner offered that the rationale for "efficient and smooth fluid transfer" from one stage to the next as a motivation for combining references. Creating turbulent flow is completely opposite from such suggestion of efficient and smooth fluid flow. Furthermore, no reference suggests using impeller vanes "that have an outer end of the leading edge of each of the vanes that is rotationally forward of an inner end of the leading edge of each of the vanes." For each of these additional reasons, Applicant respectfully submits that claims 21-22 are patentable over the cited references.

In addition to the details discussed above, claim 7 is also patentable because Vartapetov fails to teach that "each impeller vane has a straight median line that is offset from the axis of the hub." As discussed above, the Vartapetov blades 29 extend radially from body ring 27. As shown in Figure 5 of the Vartapetov patent, a line extending through each blade 29 at the median between the leading and trailing edges is in-line with a radial line extending from the axis of the Vartapetov impeller 23. Therefore, the median line of the Vartapetov impeller blades 29 fails to be offset from the axis of the body ring 27. Thus, for this additional reason, Applicant respectfully submits that claim 7 is also patentable over the cited references.

In addition to the details discussed above, claim 6 is also patentable because Fuller, alone or in combination with the other cited references, fails to teach that "each diffuser blade comprises a portion that is curved in more than one of plane." The diffuser blades 42 are curved in one plane to form the helical arrangement of the Fuller diffuser 30b. However, there is no suggestion that the Fuller blades 42 are curved along another plane. As seen in Figure 5 of the Fuller patent, the leading and trailing edges appear to be substantially straight, which suggests that the blades are angled or inclined. However, nothing in Fuller affirmatively discloses or

suggests that the Fuller blades are curved in more than one plane. Thus, for this additional reason, Applicant respectfully submits that claim 6 is also patentable over the cited references.

In addition to the reasons outlined above, Applicant respectfully submits that none of the cited references disclose a "conditioning impeller." As discussed at length in the Background of the Invention section of the Application, there are numerous problems with trying to pump gaseous well fluid, or those having a mixture of liquids and gases. Prior art systems tried to separate the gaseous hydrocarbons from the well fluid prior to pumping the liquid hydrocarbons out of the well because mixtures with more than up to about 25% caused severe problems, including: reduction in the pump head, capacity, efficiency, and "gas lock" when the gas blocks all fluid flow within the pump. Applicant's conditioning section having the conditioning impellers and conditioning diffusers create turbulence and mix the gaseous and liquid fluids so that gas separation is less likely to occur in pumping section, in order to alleviate the problems associated with the prior art pumps. Applicant has specifically claimed conditioning impellers and conditioning diffusers in claims 1, 17, as well as pumping impellers and pumping diffusers in claims 8 (dependent from 1), and 17.

One skilled in the art would appreciate that there is a difference between the conditioning and pumping impellers, as well as the conditioning and pumping diffusers included in the claims. Any other conclusion would be effectively reading out of the claims the "conditioning" and "pumping" terms.

The Examiner alleged that the Vartapetov patent disclosed both (1) the claimed conditioning impellers and diffusers; as well as (2) the pumping impellers and diffusers. However, Vartapetov states that "all of the stages (impeller and diffuser sets) are identical." the Vartapetov patent (Col. 2: ll. 54-62, Figures 2 and 3). Therefore, Applicant respectfully submits

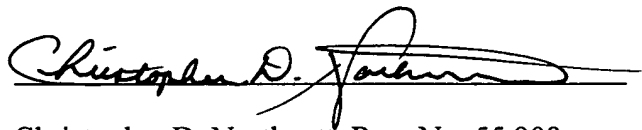
that the Vartapetov patent fails to disclose both the conditioning impellers and diffusers, and the pumping impellers and diffusers included in the claims. Moreover, even if there were a difference between the impellers and diffusers associated with each stage, there is no teaching or suggestion of a conditioning impeller and conditioning diffuser that is used on "a well fluid having a mixed flow of liquid and gas," because the Vartapetov patent only discusses pumping liquids -- not needing to be conditioned. Thus, for these additional reasons, Applicant respectfully submits that claims 1-3, 5-8, 17-18, and 20 are also patentable over the cited references.

CONCLUSION

Applicant respectfully submits that claims 1-8, 10-15, and 17-22 are all in condition for allowance. Reconsideration of the application and allowance of all claims are respectfully requested, and Applicant respectfully requests the issuance of a Notice of Allowance.

Respectfully submitted,

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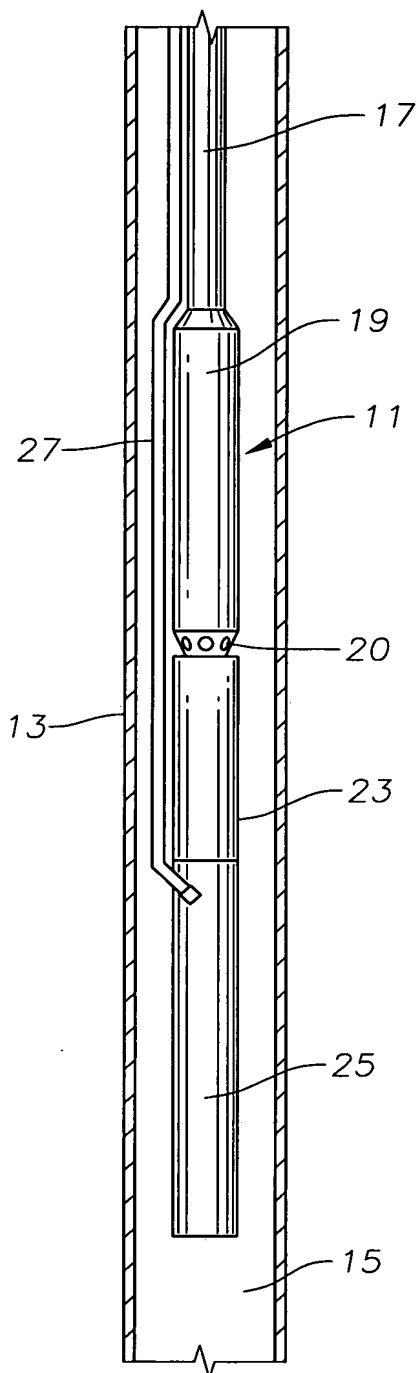


Fig. 1

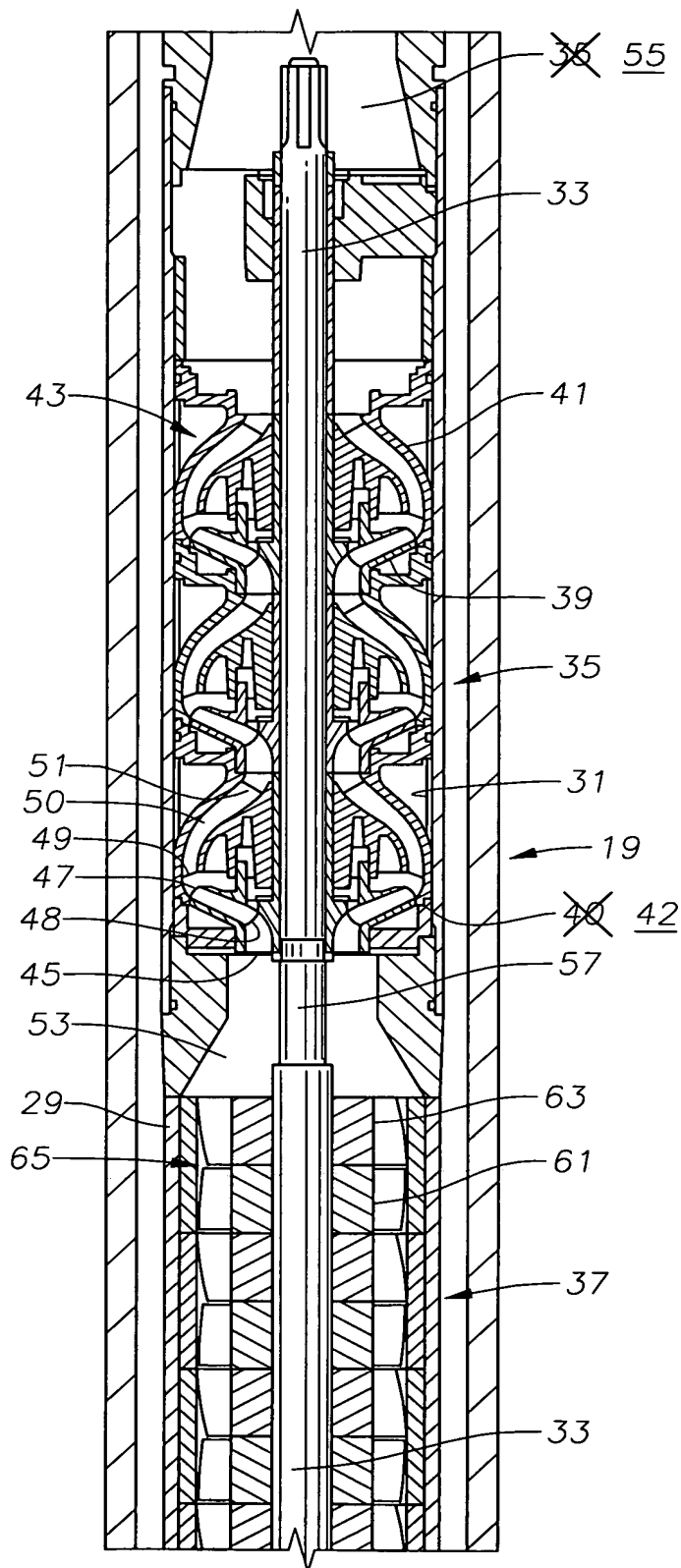


Fig. 2